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ŽIVOČÍŠSTVO AKO INDIKÁTOR ZMIEN ŽIVOTNÉHO PROSTREDIA

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na základe zisteného počtu druhov, ako aj podľa hodnôt Jaccardových a Prestonových indexov bolo zistené, že porovnávané oblasti sú si v druhovej skladbe ornitocenóz výrazne podobné.

Zohľadnením všetkých údajov zistených počas kvantitatívneho výskumu možno konštatávať veľkú podobnosť absolútnej i relatívnej kvantity ako aj dominancie jednotlivých druhov, vyskytujúcich sa v porovnávaných lesných komplexoch, ktorá je potvrdená aj identitou dominancie.

Z uvedeného vyplýva, že porovnávané oblasti Zázrivej, Istebného a Širokej sú si na základe všetkých uvedených hľadísk výrazne podobné, vtáctvo týchto oblastí je ovplyvňované prirodzenými vplyvmi prostredia /vhodnosť biotopov, trofické podmienky, klíma atď./ a zatiaľ nič nenasvedčuje tomu, že by vtáctvo v okolí Istebného a Širokej bolo imisiami Oravských ferozliatinárskych závodov negatívne ovplyvňované.

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An attempt at a possible application of zoogeographical criteria in bioindication

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One of the currently used criteria of the evaluation of the anthropogenous influences upon the zoocenoses is the α diversity. The α -diversity itself, however, does not offer any unambiguous information about the state of a cenosis, because its any value can correspond to any state of a cenosis /Oven, 1978; Šustek, 1980/. Its correct interpretations may follow only on the basis of a deep knowledge of the ecology of species constituting such a cenosis. Our present knowledge of ecology of the majority of species is, however, inadequate to the requirements of bioindication. So, some additional criteria of evaluation of the anthropical influences upon zoocenoses should be investigated to substitute our lacking knowledge. One of the existing possibilities is the application of the zoogeographical structure of zoocenoses. As generally known, there exists a considerable relation between the geographical distribution of a species and its ecology. At the same time the distributional area represents often the only profound knowledge of the individual species. The aim of this paper is to demonstrate such possible analysis of 22 tentatively selected communities of Carabidae from 9 types of ecosystems.

Material and methods

The material of 10 000 Carabids /Šustek 1982/ offered the basis for this study. The species were classified after their recent distributional areas /Fig. 1/. The percentage of species /qualitative reprentation/ and of individuals /quantitative representation/ belonging to the individual type of distribution area was calculated for each cenosis. The -diversity /in bits/ was taken as a mesure of the anthropisal influence upon the cenoses studied. The ecological characteristics was made by vegetation tiers and by the groups of geobiocens /Zlatník, Raušer 1966/.

Zoogeographical structure of Carabidae in individual types of the exosystems /Fig. 1/

The communities of litoral ecosystems and of lowland forests are characterised by high /5%/ representation of the holarctic species. The transpalearctic species dominate, the westpalearctic and the europea was represented less expresively. The qualitative representation of the westpal. species is higher than their quantitative representation in the litoral communities. Contrary, their quantitative representation is higher than the qualitative, in lowland forests. The forest communities of the 1.-4. veg. tier are characterised by the absence or by a low representation /2%/ of the holarctic species. The transpalearctic species are represented always less than the westpal. dominating in all cases. The communities of the 5.-6. veg. tiers are characterized by a decrease in the trans- and westpal. species and by the domination of the endemic species of middle-european mountains tending to

increase toward higher elevations. The communities of forest steppes and steppes are characterised by a domination of transpal. and south siberian species. They are accompanied by species having a large scale of distributional areas /Fig. 1/. In our view the higher representation of the westpal. species in forest steppes appear to be a distinguishing character between the communities of forest steppes and steppes. The communities of deserts studied are characterised by an enormously high representation of endemic /in our case turanic/ species.

Discusion and conclusions

It showes thet natural Carabid communities having a high α-diversity include species having large distributional areas whereas natural ecosystem with low α-diversity values include mostly species of limited areas or true endemites. The abiotical regulation of ecosystem results in a high representation of species with large areas and vice versa. /Fig. 1/. The decrease in α-diversity due to anthropical pressure in urban ecosystems /Brno, Lužánky, Ráječek, Soběšice/ is accompanied by a reduction of the zoogeographical structure of the community. In such cases the representation of species increases, the area of which coincides with the zonal distribution of the biom to which the community belongs. So, e.g. the representation of westpalearctic species increases in the influenced forests of the 1.-4. veg. tier, the representation of holarctic species increases in azonal communities etc. If the intensity of the anthropical pressure causes the starting succesion into other types of ecosystem /e.g. in forests or in deserts turned to a cultural steppe/, the zoogeographical strusture becomes complex, including species of the large scale of various distributional areas. Their mutual relation depends from the degree of succesion and from the intensity and mode of its regulation by man /Šustek, Vašátko 1981/. The diversity increases in such case irrespective of profoundly secondary character of such communities /e.g. urban gardens/. During the initial changes of a community usually alterations in the quantitative representation of various distributional area-types can be observed preceeding the qualitative changes. During a developing succesion qualitative changes preceed the quantitative changes /Šustek 1982/. A few tentatively selected examples indicate that anthropical pressure seriuosly affect zoogeographical structures. This fact seems to be another important factor of bioindication.

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Abreviations and symbols to figure 1.

H - holarctic, Tp - transpalearctic, Z - westpalearctic, E - European, S - middleeuropean, Sk - sudetocarpathian, J - southsiberian, M - mediteranean, P - pontomediteranean, Bk - carpathobalcanian, B - balcanian, V - eastmediteranean, T - turanic, Pa - pamirian, D - dobrudzhean; AF - Abieti Fageta, FQ - fagi Querceta, CoQ - Corni Querceta, degr. stadium, UFrc - - Ulmi Fraxineta carpinea; integers - numbers of veg. tiers according Zlatník and Raušer /1966/, Al - aluvia; numbers in parantheses - α -diversity in bits /calculated by Shannon-Wiener formula/; white columns - qualitative representation in %, black columns - quantitative representation in %.

Fig. 1 Representation of individula distributional area-types of Carabidae in selected ecosystems